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Nurses' experiences of the most common medical errors in the intensive care unit and the coronary care unit: A hermeneutic phenomenological study from Palestine

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Abstract

Background: Human error occurs in every occupation. Medical errors may result in a near miss or an actual injury to a patient that has nothing to do with the underlying medical condition. Intensive care has one of the highest incidences of medical error and patient injury in any specialty medical area; thought to be related to the rapidly changing patient status and complex diagnoses and treatments.

Aims: The primary aim of the study is to investigate nurses' experience of the most common medical errors in critical care units and coronary care units. The secondary aims: are to assess the nature, consequences, and associations of medical errors in ICUs/CCUs, to examine the factors influencing nurses' errors, and to propose strategies to prevent errors.

Setting: five intensive care units (ICU) and two coronary care units (CCU) in five governmental hospitals and one coronary care unit in a private hospital on the west bank of Palestine.

Sample: fifteen registered nurses (12 ICU nurses, 3 CCU nurses) who have at least four years of experience in the critical or coronary care units.

Research methodological design: Using qualitative methodology, hermeneutic phenomenological approach semi-structured interviews were guided by a script that included a series of both open-ended and Pop questions.

Results: the nurses' experiences of the most common medical errors in ICU and CCU are presented in nine themes: Medication errors, technical equipment errors, patient monitoring errors, resuscitation errors, nursing procedure errors, intravenous solutions errors, patient care errors, documentation and assessment errors, and communication errors among health teams.

Conclusion: Practical nurses made substantially more medical errors. Working frequent shifts of 24 hours is a strong factor to commit medical errors. Increasing the competency and number of nurses per patient and reducing the number of working hours can reduce medical errors and address patient safety concerns in intensive and coronary care units.

Keywords: Nurses' experience; intensive care unit; coronary care unit; medical error; patient safety; hermeneutics; phenomenology.

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Introduction

Nurses' experiences of maintaining the quality of the practice are important in the context of today's safety and quality agenda. The intensive care unit (ICU) is complex and has one of the highest prevalence of medical errors. Patient injury is believed to be related to the rapidly changing patient status and complex diagnoses and treatments [1]. The organization of ICU patients varies greatly and is taken care of by many different providers who use different technologies. Therefore, adverse event reports are an important component of improving patient safety. Studies suggest that errors and adverse events that may result are common in ICUs [2]. One study found that staff reported a serious event for 17% of patients [3]. An evaluation of errors in the intensive care unit that is used both self-produced reports and direct observations to count errors found 1.7 errors per patient per day [4] of these errors were 29% can cause significant injury, including death and for every day in hospital likelihood of experiencing an adverse event increased by 6% [3]. Studies have recognized that the safety of patients in this high-risk area can be compromised resulting in an increased risk of medical error [5, 6]. Researchers have suggested that the control of error should be an integral part of the quality assurance of all the health providers [7]. There are no reported studies on nursing medical errors in Palestine, and therefore we sought to examine the nature, consequences, and associations of medical errors in ICU / CCUs reported by the ICU-CCU nurses and to examine the factors influencing nurses' errors. This will help to suggest strategies to prevent errors.

Background

Attention to medical errors escalated some years ago with the release of a study from the Institute of Medicine (IOM), which reported that Medical errors cause more than one million injuries, and between 44,000 and 98,000 Americans die annually in hospitalized patients due to medical errors which can preventable. Hospital errors rank between the fifth and eighth leading cause of death, killing more Americans than breast cancer, traffic accidents, or AIDS. Serious medication errors occur in the cases of five to 10 percent of patients admitted to hospitals. The Intensive care units (ICUs) are sites where the highest rates of medical errors occur [8]. In a study by [22] which recorded eighty-seven errors for 87 patients, their distribution within the ICU sections as the following: thirty-six (41.3%) were medication errors, and 17 (19.5%) related to intravenous infusions; 15 (17.2%) were errors with technical equipment, and 19 errors (21.8%) were miscellaneous. Only 14/88 (16%) errors were reported during the night.

Definition of medical errors:

The most commonly used definition of medical error is one developed by the Institute of Medicine defines medical error as "the failure of a planned action to be completed as intended (i.e. error of execution) or the use of a wrong plan to achieve an aim (i.e. error of planning)" [1, 9].

Classification of medical errors

Medical errors were classified according to clinical activity, including diagnosis, treatment, procedures, monitoring, and communication of clinical information. Errors were further classified according to the associated individual and systems factors and the behavioral performance class or type. Performance errors were classified as skill-based errors (failure to carry out intended plans of action, including unintended acts and lapses or omitted acts), rule-based mistakes (such as using an incorrect treatment protocol), and knowledge-based mistakes [10].

Causes of medical errors

The causes of medical errors are complex and not yet completely understood. Some causes that have been identified include the following:

- Communication errors.
- In some cases, the nurses face misinterpretation of the doctor's prescription or the message from the peer.
- The increasing specialization and fragmentation of health care. The more people involved in a patient's treatment, the greater the possibility that important information will be missing along the chain.
- Human errors result from overwork and burnout. For some years, hospital interns, residents, and nurses have attributed many of the errors made in inpatient care to the long hours they are expected to work, many times with inadequate sleep. With the coming of managed care, many hospitals have cut the size of their nursing staff and require those that remain to work mandatory overtime shifts.
- Manufacturing errors. Instances have been reported of blood products being mislabeled during the production process, resulting in patients being given transfusions of an incompatible blood type.
- Equipment failure. A typical example of equipment failure might be an intravenous pump with a malfunctioning valve, which would allow too much of the patient's medication to be delivered over too short a period.

Poorly designed buildings and facilities. Hallways that end in sharp right angles, for example, increase the likelihood of falls or collisions between people on foot and patients being wheeled to an operating room [11].

Theoretical framework

Patient safety

Research shows that patient safety is affected by several factors. Everyone working in complex organizations to which hospitals are counted is interdependent interactions. Those who are involved in patient care must understand their roles and responsibilities and that their behavior affects all members of the team [12].

A study by (Leonard et al 2004) shows that the working climate at hospitals varies, there are “quiet” hospitals where problems that arise are ignored because of poor leadership, hierarchy, and fear of reprisals. What is not visible is no possibility to do something about it. Joyce Travelbee’s nursing theory deals with interpersonal aspects of nursing. Travelbee (1971) argues that nurses need to understand what happens between patient and nurse caring for understanding how interactions are perceived and what impact this may have on the patient. Travelbee (1971) argues that communication is important to make cooperation work. If cooperation is disturbing deficiencies can occur in relationships that affect patient safety. Travelbee (1971) rejects the generalized concepts such as nurse and patient, as they blur the individual’s characteristics and turn people into stereotypes. She focuses on the interaction between nurse and patient, the patient is at the center.

Problem statement

Medical errors are common in ICUs and CCUs. A hermeneutic phenomenological approach (interpretation of the meaning) can help us to identify nurses’ experiences of the most common medical errors in the ICU and CCU, and the importance they attach to these experiences. This will help us to determine the causes of medical errors to propose strategies to prevent errors.

Significance of the study

Health care organizations are facing increased pressure to adopt intelligent technology to promote the quality and safety of care in hospitals. Medical error is each event during treatment of the patient in an ICU, which if not detected and corrected in time would affect the outcome of the patient. The importance of monitoring by a trained person is thus emphasized. Since the care of another human being is the essence of nursing and nurses need to understand how their actions and experiences affect quality care. Since the quality of clinical practice affects patient outcomes, quality has become one of the main issues of health care worldwide. Patient safety is good quality and important input in health care. Research shows that patient safety is affected by several factors. Those who are involved in healthcare must understand their roles and responsibilities and that their behavior affects all members of the team [12].

Literature review

A review of the related ICU and CCU errors literature revealed that errors, incidents, and events are common and in some cases reported while in others, not so to the full potential. A study by [24] showed that between 4% and 17.7% of patients suffer from some kind of harm (including permanent disability and death) as a result of adverse events while in hospitals (ICUs). In one large intensive care unit (ICU) study Andrews et al (1997) showed that 45.8% of patients were found to have an adverse event, with 17.7% suffering from death or severe disability, and for every day in the hospital the likelihood of experiencing an adverse event increased by 6%. A one-year observational study completed by [6] in Medical intensive care unit and coronary care unit patients of tertiary care urban hospital recorded 120 adverse events (55%).

Non-preventable and 45% preventable) for 79 ICU patients during 1490 patient days, these statistics represent a rate of

80.5 for all adverse events, 36.2 preventable adverse events, and 149.7 for serious errors per 1000 patient days. [6] found that the most common errors occurred associated with prevention and diagnostic errors, failure to take precautions or follow protocol to prevent accidental injury, premature self-extubations, failure to use indicated tests or act on test results, inadequate patient assessment, treatment and procedure errors, medication error in ordering or execution of treatment (wrong dosage, duplicate medication orders, wrong medication, failure to discontinue a medication order, wrong rate or frequency, wrong route, omitted medication, wrong patient), inadequate reporting or communication, failure to check equipment or defective equipment.

In another study in Australia where data was collected over 16 randomly selected days at different medication round times which was done by [13]. They found most medication errors regarded to fast bolus administration, wrong infusion rate, wrong dose or diluents, calculation errors, inappropriate diluents, inappropriate storage of drug before dilution, and inappropriate storage of diluted drugs.

A comprehensive review of errors in ICU by [14] highlighted missed diagnosis found on autopsies may have changed or improved treatments in 30% of ICU patients, while 30% of patients incurred medication errors. Arterial cannula adverse events were shown in 15% of ICU patients and central venous catheter (CVC) adverse events in up to 26%. Although preventative measures are available for CVC adverse events, such as anti-microbial impregnated catheters and use of the subclavian site to reduce infection and thrombosis, and for ventilator-associated pneumonia, such as using the appropriate antimicrobial treatments, they may not be routinely implemented.

A prospective study in India by [15] was designed to have an insight into critical events occurring in the 13-bedded multidisciplinary intensive care unit (ICU) to report the critical events. The errors reported were due to wrong mechanical or human performance. Repeated performance errors of the same kind pointed to the problem area, to which was paid proper attention in the required manner. Some malfunctioning equipment was abandoned and the need for adequate availability of staff was emphasized, so most of the errors associated with ventilator, intubation, and extubation which shown as the following Extubation 29.62%, Intubation problem 7.40%, Blocked endotracheal tube 7.40%, Ventilator disconnection 11.11%, Oxygen disconnection from central pipeline 3.70%, Fall from bed 3.70%, Improper mode of ventilator 3.70%, CVP related 3.70%.

A study by [16] in the UK was conducted on two-hundred and sixteen consecutive patients with predominantly cardiovascular and pulmonary disorders admitted to ICUs. Most of the errors that were occurred frequently related to different causes which include rules and orders, communication insufficiency misunderstanding, echocardiographic assessment, delayed intervention, overwork and lack of time, lack of experience, electrocardiographic assessment, wrong diagnosis, drug-related errors (drug given but not prescribed, wrong dose), equipment error, very ill/complex patient.

In a multicenter prospective study by David et al (2007) of 646 incidents involving adult medical patients and 707 incidents involving adult surgical patients. They compared inci-

dent characteristics, patient harm, and associated system factors for medical versus surgical patients. For 2 years period, they found that the proportion of safety incidents reported for medical versus surgical patients differed for only 3 of 11 categories: equipment/devices (14% vs 19%), tube, or drain events (8% vs 13%). The type of patient harm associated with incidents also did not differ. System factors were similar for medical versus surgical patients, with training and teamwork being the most important factors in both groups.

Main objectives of this study are to:

- Assess the nature, consequences, and associations of medical errors in ICUs/CCUs.
- Examine the factors influencing nurses' errors.
- Propose strategies to prevent errors.

Research Questions

- What are the types of medical errors (such as incorrect medication, intravenous infusions, equipment failure, procedures, or miscellaneous)?
- When the error has happened (hours to days)?

What are the consequences of failure (such as circulatory, respiratory, allergy, hyper/hypoglycemia, physical injury, bleeding, death, and others), and the use of additional monitoring and interventions needed?

Research Methodological design

A qualitative method, hermeneutic phenomenological approach this study used a phenomenological hermeneutic method inspired by Ricoeur philosophy, which was developed by Lindseth and Norberg (2004). Hermeneutics is the research method seeking to understand the meaning of a phenomenon through interpretation. According to Ricoeur, text can generate new knowledge to enhance the understanding of the lived experience phenomenon. Semi-structured individual interviews with informants were guided by a script that included several open questions. The interviews began with a general conversation to establish trustful contact between researcher and informant [17, 18]. The interviews were last between 30-60 minutes. Interviewees are female and male registered nurses and aged between 25-50 years. The number of years in the profession ranged from 2 to 20 years. The interview opened with the following an Open ended question "Through your experience in the intensive care unit what are the most common errors of nursing? Then pop questions followed such as what the consequence or the adverse events on the patient? What are the causes of error? When occurred? Is the night shift affect the occurrence of errors? Who made the error, a practical or registered nurse? The interviews were tape-recorded and transcribed verbatim, then to text. Trustworthiness of the data is ensured by appropriate sample selection to ensure credibility, show the logical flow of the data collection and analysis, and by verifying the findings with the informants to demonstrate the fittingness, or transferability of the findings [19, 20].

Participant

Fifteen of the ICU and CCU nurses (8 men and 7 women) were interviewed to gain a deeper knowledge of how they experi-

ence medical errors in intensive care; Demographic data were collected for all eligible participants. These include age, gender, years of experience, and marital status.

Selection of sample

Convenience sampling is used in sample selection which entails using the most conveniently available study participants recruited in the study.

Selection: Registered nurses (males and females) from the nursing staff they full fill the including criteria which are:

- RNs working in the ICU or CCU with up to 2 years of experience
- Working day and night shifts
- Be 25 years or older.
- Understand and speak the Arabic language.

2 to 3 nurses were selected from each unit of the target ICU units (12 participants 7 males and 5 females) and three nurses from the CCU unit (one male and two female). They are 15 participants.

Setting: This investigation was conducted in a combined ICU and CCU ward at governmental hospitals on the west bank of Palestine. Geographically separate hospitals are willing to take an active part in reporting medical errors. The study was conducted in five Palestinian intensive care settings, including public/governmental hospitals: Al Watani (ICU-2N), Rafedia (ICU-3N), Hebron (ICU-2N and CCU-2N), Tulkarem (ICU-2) and Jenin (ICU-3), added to this the pilot test interview (one CCU nurse) that was taking place in a private hospital.

These departments in the target hospital are described as poor design (low service area), except one coronary care unit with good design and one intensive care unit has ideal design, in addition, the all target units have practical and registered nurses.

Period: a period of four months which is, from September to December 2010

Data Collection

Health care director at each hospital selected nurses eligible for entry in the study. One of researcher Contacted nurses and informed them, both in writing (Information for Research Appendix No. 2) and orally about the study and agree on the time of the interview. At the beginning of the interview, the researcher repeated the information and asked for consent to interview (Appendix No.2). The interview was conducted during the current work of nurses. Data collection has been done through qualitative interviews in the form of conversations with open questions that are considered the most appropriate way to raise awareness of people's experience of a phenomenon. We implemented fifteen semi-structured individual interviews which are about an hour in duration each.

The interviews were recorded on tape. The interviews were conducted in a separate meeting room in the department, where the nurse works. In the interview situation is only the informant and the interviewer, who is the current researcher [5]. In this study, interviews were conducted in the hospitals because the work is focused on creating an understanding of

the everyday lives affected by medical errors. The interviews are intended to be semi-structured [17]. The interviews, however, are open. An interview guide was used (Annex 1). The purpose of the interview guide is to provide a framework for interviews [17]. The audio-taped interviews were guided by a set of trigger questions designed to reveal the informants' behavior, meanings, ways of thinking, and emotions. Interviews were transcribed for analysis, with additional information from field notes, which helped triangulate data sources. The interview's preliminary question is "Through your experience in the intensive care unit what are the most common errors of nursing? This question was posed to all nurses as they would be allowed to speak freely about what they considered important. Additional questions were used to deepen the answers "Can you tell us about your experience with medical errors in your health department?", "What are the types of medical errors that can occur in your department?", "How often are incidents? What are the consequence or the adverse events for the patient? What are the causes of error? When occurred? Is the night shift affect the occurrence of errors? Who made the error, a practical or registered nurse? When people were interviewed talked about several things at once. It is important to be able to come back and deepen the conversation around the issues perceived as relevant by the interviewees. The interviews ended by asking if there is anything they want to talk about further. The conversation ends with a short informal conversation after the tape recorder is switched off (Lindseth et al 2004). The interviews were transcribed verbatim to maintain openness to the text and allow finding the meaning-bearing units in the text. Transcribed interviews produce a text that contains descriptions of perceived experiences of medical errors.

PILOT STUDY

The above method was tested in the pilot study. The pilot study involved one male informant in a coronary care unit of a private hospital. The health care manager choose a nurse, who was asked to participate in the study. The interviewer was told, about the nurse who wished to participate. The interviewer contacted the nurse and informed them about the study orally and submitted in writing information for research (Annex No 2), the agreement was available at the interview. The interviews were done in an isolated room in CCU. The call was taped and the text was treated following the above analysis. This pilot interview was included in the study sample.

Analysis

Using a hermeneutic phenomenology framework for the research enabled the development of an interpretive relationship with the experience described by the 15 (7 females, 8 males) nurses who participated in the study. Potential participants were identified by the head department of ICU-CCU and subsequently provided an invitation to take part in the study. These practical- and- registered nurses, from across the continuum of care (ICU, CCU), provided care to ICU-CCU patients as part of their regular duties. They were not specialists in ICU-CCU care. Their nursing experience ranged from slightly more than 2 years to 20 years; their ages ranged from 25s to late 50s. The semi-structured interviews were conducted individually and away from the workplace and recorded and transcribed. The transcripts provided rich data for interpretation. The voices of the nurses in this study spoke with a powerful

unity that imparted a message that should resonate with all ICU-CCU care clinicians.

The analysis seeks to illuminate the meaning of the text. Within hermeneutics analyzed in the text, it is read as a continuous change between parts and whole. The whole can never be understood solely from parts and components cannot be understood without the whole [17, 21].

The interviews were transcribed verbatim and all identifying features removed to ensure anonymity. Word processing involves three phases: naive reading, structural analysis, and interpretation entirety. The naive interpretation was created after several reads and would be part of this whole analysis process. When meaningful units are used in the phenomenological part of the method. Pre-understanding could be allocated for the production of meaning-bearing units. A meaningful unit may be a paragraph, a sentence, or part of a sentence (Lindseth et al 2004). To make a thematic structural analysis the interviews read with an open and flexible attitude to get a basic sense of the interview participants' stories. The meaning-bearing units are reflected against the naive analysis. The meaning-bearing units are condensed. (Lindseth et al 2004). The condensed sentences are read and the similarities and differences were applied. The goal to find similarities and differences are to form subthemes and then the main themes. The interpretation process allowed to get to use of pre-understanding. During the formation of the key themes and sub-themes used by previous experience of working in ICU and also understanding of the phenomenon of literature. According to Lindseth and Norberg (2004), condensation and sub-themes all the time compared with the naive interpretation. The main themes and sub-themes are the result of the thematic structural analysis.

Research Ethical considerations

The study was approved by the Ministry of Health and An-Najah National university's Research Ethics Boards (IRB). Consent was obtained from informants who agree to take part in the study. (Annex 2). The informants, who wish to attend are informed by the interviewer, both verbally and in writing (Annex 1) for the interview and study, the agreement was obtained at the time of the interview. The informants informed that the interview was conducted in a private room which just the informant and the interviewer present and that the interview was recorded by tape recorder and that no individuals can be identified after text processing. Information on all bands and prints the text stored under the current rules in locked cabinets. The informants were also informed of the voluntary nature to participate in the study and that at any time can stop the interview and that these do not affect them in any way. The data is stored until the investigation is completed. After that the data the material will be destroyed from the interviews.

On the information sheet, there are telephone numbers for interviewers and supervisors about any issues that will arise if the informant feels the need for further discussion. These considerations are based on the Helsinki Agreement (World Medical Association. Helsinki Declaration (2008) on ethical guidelines for nursing research on volunteerism, to withdraw from the project, potential risks or discomfort, anonymity, confidentiality, and contacts for any information needed. There is a risk that nurses feel offended at questions about

their experiences. The interview can elicit negative emotions and bring back difficult memories. There is a risk that the participant would have thought what he/she said during the interview may affect the way ahead, while there is an advantage that the Nurses' experience of maintaining the quality of the practice is important in the context of today's safety and quality agenda. Therefore, the risk is minimal compared to the benefits of the study.

Results

Naive understanding

The naive understanding, that is, the first understanding of the text as a whole, and the preliminary interpretation of the phenomena is in the context of nurses' experiences of the most common medical errors in ICU and CCU. The meaning of the nurses' experiences is also evident as a quest to fulfill an ideal image of the most common medical errors in ICU, and CCU. Through our interviews with nurses working in ICU, and CCU, we have noted that the errors that have occurred and still occur so far are One of the most common errors recorded was in the route of medication administration and one of the other errors relating to medication was wrong the number of drugs that are given (error in the calculation of medication dose), in addition to the information that we have raised that the lack of adequate knowledge among ICU / CCU nurses about the dilution of narcotic drugs and during the conversion of the drug amount units from mg to ml. The nurses showed that the lack of guidelines, knowledge of the drugs' side effects, and standards for drug dilution and for how long should be given (specific period of administration) were the main reasons to commit these errors.

The second most common error is shown were in the handling of equipment, machinery, and appliances used in these departments, and nurses have to do with the ventilators as a routine and follow the same parameters that are stored in their minds, so there was no one nurse on the ward can manage children ventilators. In addition, when there are many patients in the same department and nurses were occupied with the care of another patient that increases the risk of errors. Another error in the handling of machines has been produced by poor interpretation of the readings that lead to wrong actions. These errors are associated with certain reasons summarized in the bug damage in cables and not enough attention is given to the screens of monitors of group members.

Data said another error was about monitoring patients. These are presented in not recording the intake and outputs, or not recording it accurately based on workload, and not concentrated attention was given to it. A lack of team members has led to some patients falling which head caused patients harm. It was shown that most of the fall events happened especially in children and it happened an average of twice a month.

Nurses expressed that there is some error during work in heart-lung resuscitation situations which includes the wrong drug to be administered as adrenaline, dealing, and atropine. This is related to certain factors that the large number of employees during the procedure, lack of regulation and issue of commands to more than a leader, not enough experience in dealing with patients requiring CPR in the sequence of steps as well as the lack of manual skills that need to be made, also

some of the nurses do not have sufficient knowledge and experience in the use of Ambo-bag in the right way and make appropriate open airway management and not frequent inspection of DC shock which founded damaged and has not worked in some cases, which often led to patients loss and this occurred especially during night shifts.

Interviews with nurses described some errors during the implementation of interventions, including needle insertion, foley catheters, and nasogastric intubation. This causes mainly severe bleeding and other complications that happened in the absence of manual skills. In addition, there are some errors related to the IV fluids that occurred often. In many cases, nurses forget to complete IV Lines after the completion of the solution provides, and there are a lot of IV fluids are not given on their time because of worsening in IV lines, canulas, and machinery droppers.

Many nurses gave IV fluids instead of others, such as N \ S instead of D \ W for hypertensive patients, and this eventually led to the increasing deterioration of the cases. The main reasons for it were work overload, negligence, and lack of attention by team members. In many cases, as explained by nurses is an error that happened during the suction procedure that does not use an Ambo bag between the measures led to cyanosis and lower the level of oxygen saturation in tissues and most of the nurses did not proceed with the suction on the right and safe way, this led to airway blockage and infection, all these because of the lack of manual skills, misconduct, and malpractice of the nurses.

Other errors were expressed in sterile techniques during certain procedures such as the introduction of the catheter, which in many cases led to UTI occurrence and other errors identified in the care of IV Canulas, CV lines, and arterial lines, and this often causes the infection to their sites. It was also found that nurses do not often change the position of the patients. This led to the development of bedsores, which harms the patients much. The nurses have not made oral care for patients who are on ventilators, which led to the cause of pneumonia and chest infections in many cases. The interpretation was not appropriate for team members and negligence. Some of the errors that occurred in the documentation and evaluation include forgetting medication record and did not assess the patients and did not take a complete history of patients. All these things can harm the patients.

Structural analysis

In the structural analysis, the text has been divided into units of meaning. A meaningful unit could be a word, a paragraph, or a sentence that expressed similar content and meaning of the most common medical errors in ICU and CCU. Then condensed meaning units was proceed. The text of abstracts is then formulated into subthemes and finally into themes (**Table 1**). The results presented the meaning of the nine themes. The theme of the nurse's experiences of the most common medical errors in ICU and CCU and clearance is presented in a separate table (**Table 2**) to illustrate the analysis process.

Structural analysis was thematic; themes were identified and

Table 1: themes

Themes	Subthemes
1. Medication errors.	<ul style="list-style-type: none"> • Errors in the Rout of medications administration. • Errors in the calculation of medications doses. • Errors in giving the right medications (wrong medication). • Errors in the dilution of medications. • Errors in medication administration time.
2. Technical equipment errors.	<ul style="list-style-type: none"> • Errors in dealing with the ventilator. • Errors in dealing with monitors. • Errors in dealing with a defibrillator. • Errors in dealing with dropper machines.
3. Patient monitoring errors.	<ul style="list-style-type: none"> • Errors in Intake/ output measurement. • Patient's falling down. • Patient's self – extubation. • Patients self-injury.
4. Resuscitation errors.	<ul style="list-style-type: none"> • Errors in steps consequence. • Errors in Ambo-bag use.
5. Nursing procedure errors.	<ul style="list-style-type: none"> • Suction errors. • Invasive procedure errors.
6. Intravenous solutions errors.	<ul style="list-style-type: none"> • Errors in the administration of IVF. • Error in the duration of administration of I.V solutions.
7. Patient care errors.	<ul style="list-style-type: none"> • Dressing errors. • Positioning errors. • Mouth care errors. • Morning care errors.
8. Documentation and assessment errors.	<ul style="list-style-type: none"> • Errors in the recording of vital signs. • Missed medications' documentation. • Errors in the documentation of patient's history and assessment.
9. Miscellaneous	<ul style="list-style-type: none"> • Poor communications.

Table 2: Example of how to emerge the medications error based on meaning-bearing units, condensation and subtheme, and theme of medication error.

Meaning bearing units	Condensation	Subtheme
– Giving the narcotic		
drugs as pethidine IV	– Giving the I.M medica-	
instead of IM.	tions by I.V rout.	– Errors in Rout of medications administration.
- Administration of inha-	– Giving the inhalant medications by I.V rout.	

lant aerovent I.V instead of the nebulizer.		
	– Giving the I.V medications in arterial line.	
– giving the anti-biotics		
	– Giving the wrong dose of medications to the patients.	Errors in the calculation of medication doses.
– Giving the wrong dose of magnesium sulfate and dopamine. – Giving the mannitol 500cc instead of 100cc		
– Giving of fortum instead of rocephine. • Giving atropine or de-cort instead of adrenalin. • Giving succicycoline instead of gentamicyne...	– Hodgepodge between medications or giving the wrong medications for the patient during administration.	– Wrong medication.
• Giving vancomycin deluted with 10cc rapidly instead of 200cc/2h. • Giving zetromax I.V push instead of dilution in 500cc. • Giving dormicom and morphine I.V push instead of dilution in 20cc.	– Dilute the medications in the wrong amount of solution.	– Errors in dilution of medications.
• Giving the diluted lidocaine rapidly should be given for six hrs.	– Administration of di-luted medications during the wrong period.	– Errors in medication administration time.

formulated from the text. The whole text was divided into significant units and these were reflected in the naive understanding of the text and concentrated to find similarities and differences. The nine themes that emerged from mediated nurse's experiences of medical errors were of essential importance to the interviewees. These are presented below with the respective sub-themes, which are presented with short summaries of the interviews.

Theme 1: medication errors.

This them about errors occurring in medications, the nurses experienced many medication errors in ICUs and CCUs which happened under preparation and administration of the medication.

Under this theme, five sub-themes emerged as illustrated below:

1- Rout errors.

Errors in the route of administration of medication were one of the most common errors in the ICU.

- giving Inhalant aerovent through a vein instead of nebulizer”(N9).

- pethidine (narcotic) through intravenous (IV) instead of IM" (N1).
- antibiotics in the arterial line instead of the venous line" (N11).
- scobutyl instead of ranitidine and Rufenal IV instead of IM..." (N1).
- 'a new graduated nurse gave rufenal I.V instead of I.M" (N15).

2- Errors in the calculation of dose.

The interviews revealed an error in the amount of medication given as some of the nurses said: —They gave dopamine cardiac dose instead of renal dose because of a lack of precision in the calculation of the amount of medicine where there has been occur in the afternoon shift" (N12).

—Some nurses do not have sufficient knowledge and experience to convert the amount of the drug from mg to ml, such as magnesium sulfate, calcium sandose, and others, especially in cases of resuscitation (N3, N4, N14).

- "few nurses inaccurately measure or calculate the dose of dopamine " (N15).

— A practical nurse on the night shift gave 500cc mannitol instead of 100cc and so the nurse gave a much higher amount than the amount described which led to that the patient enter in a severe

dehydration" (N11).

3- Errors in giving the right medication.

Some of the interviews showed that some nurses experienced a mistake in giving the right medications to the patients in some cases—One nurse gave fortum instead of recophin but it did not cause any damage to the patient, they thought the cause of the error could be that the nurse was using to work double shift..." (N8).

"In emergency cases sometimes giving atropine or decort instead of adrenalin due to overlapping orders of the medical doctors" (N4).

—In emergency situations, a practical nurse who was working on the night shift gave succinylcholine/sculine (muscle relaxant) instead of gentamycin and the patient got into cardiac arrest and was placed on a respirator" (N11).

4- Errors in dilution of medication.

The data was expressed that the lack of sufficient knowledge in ICU/CCU nurses regarding the dilution of drugs; in addition, the nurse explained that the lack of guidelines and standards on how to dilute this drug and for how long time should be given was the reason in committing an error.

"...some of the nurses dilute the vancomycin in 10 cc and give it to the patient quickly which was original should be diluted in 200 ml for one gram vancomycin vial and should be given in two hours" (N13).

—zetromax was given IV push which should be diluted with 500cc N / s, and this led to the occurrence of skin burn at the cannula's site" (N8).

—dormicum gave IV push instead of its dilution in 20 cc N / s and led to the occurrence of hallucinations and nausea and that happened in the night shift with a patient who was suffering from hypoxia.....", As well as —morphine IV push instead of dilution in the 20cc N / s..." (N7).

5- Errors in medication administration time.

Some nurses were not giving the medication on time and within the specified period:

—one nurse sped up a solution containing Lidocaine which was supposed to be given within 6 hours to one patient who was suffering from a cardiac problem This led to the occurrence of

a tremor in the patient and the reason for committing the error was a lack of knowledge of the side effect of the drug" (N8).

"in a case of epilepsy one nurse administered Rocephin in the volume set which has an epanutine that led to drug reaction.....also some of the nurses give cephalosporine medication with vancomycin without know that lead to milk reaction....." (N14).

Theme 2: Equipment and devices (technical equipment) errors.

This they divided into four sub-themes below:

1- Errors in dealing with ventilators.

The nurse's experience returned to the error of ventilators, there is a lack of adequate knowledge among nurses about ventilator use, especially for children.

"A nurse sets up the ventilator with a tidal volume of 700 ml for a child. This amount is used for adults, but he/she discovered the error and quickly adapted to it" (N11).

"A Practical Nurse Puts a patient who is on a ventilator at high PEEP, and this has led to the emergence of emphysema and the reason was the lack of sufficient experience in the use of this machine, as well as the existence of a defect in the machine. This happened on the night shift with COPD patients" (N8). "An RN placing a child with a diagnosis of a scorpion bite on the ventilator with a respiratory rate of 75 per minute instead of 15-25 as usual. This error was discovered during the first hour without causing any harm to the patient (N1).

"Nurses use ventilators as a routine; they are using the same parameters that are saved to their memory.

There is no nurse on the ward who can deal with children on a ventilator" (N1).

2- Errors in dealing with the monitor.

Through the interviews, we noted that the presence of errors was in dealing with Monitors

"Some nurses do not pay attention to the screen of the cardiac monitor, in one case, tachycardia occurred for the patient but the nurse did not give attention to it, in addition, some nurses did not remember to re-connect the electrodes on the patient's chest after the Patient returned from the bathroom" (N4).

"Multiple errors in the interpretation of the ECG due to a bug and damage in the cable, and this happened several times" (N8).

3- Errors in dealing with the defibrillator.

Some nurses did not give attention to the control of the defibrillator to keep it ready for use...

"It happened with a patient who needs a D \ C Shock, shock driver does not work.....it's defective, and device founded out of order and this led to patient loss" (N8).

4- Errors in dealing with Dropper machine.

—In some cases, nurses experienced that the solution and medications were not given on time or not delivered to the patient in the determined period, because machines are old fashion and inappropriate speed was given N1, N2).

Theme 3: Patient's monitoring errors

Some nurses note that errors in Patient Monitoring occurred:

1- Errors in patient's intake and output measurement.

An incorrect measure of the patient's intake and output as one of the nurses said:

—There are a few of the practical nurses were not paying attention to the registration of E & O or that they do not record it exactly because of pressure from work" (N1, N12).

—Sometimes the patient becomes anuria and the nurses did not pay any attention to it" (N3, N15).

Another added "a patient gave a large amount of N \ S without attention to the lack of output which has led to general edema and the reason for this event was negligence and lack of ongoing communication/poor communication among members of the team as well not to pursue the good of the patient. This event happened on the night shift"(N8).

2- Falling down.

Sometimes the lack of patient monitoring led to falling down injury.

"In one case, the patient falls from her bed, this led to nose-bleeds, wounds, and removal of the drain" (N11).

"In many cases of falling down of the patients caused by a lack of the number of nurses when there are many patients on the ward" (N1, N2, N5).

3- Patient's self-injury.

"In a confusing case, the Foley catheter disconnected which led to the wrong measurement of urine output that occurred in a myocardial infarction patient,

In another case, they found that the pt bled from the i.v. cannula site after it was removed unintentionally by the patient. The pt was on anticoagulant therapy, which led to hypovolemic shock"(N9).

4- Patient's self-extubation.

The Patient's self-extubation mostly occurred in the weaning stage where some of them never had any complications as a consequence of self-extubation and some of them have been

re-intubated and some of them entered an arrest.

"one patient pulled out the endotracheal tube in the last stage of weaning, there have been no complications, and was treated with oxygen. It is estimated to occur 2-3 times per year"(N11).

"5 cases of self-extubation occurred with children because of the uncuffed tube, as a result, some of them reintubated and some of them died"(N11).

"In some cases, the self-extubation occurred at the time of consciousness" (N13, N15).

As a result, Most medical errors occurred when they are many patients in the department and nurses were occupied with providing care for other patients.

Theme 4: resuscitation error.

These themes are divided into two sub-themes as the following:

1- Steps consequence errors.

The error happened because nurses do have not sufficient experience in dealing with how to work with a patient who needs CPR in terms of the sequence of steps as well as the lack of manual skills. Some nurses do not have sufficient knowledge and experience to use the ambo-bag correctly and often lead to the death of the patient and this happens especially in the Night Shift "(N10).

Some errors occurred during the work with cardio-pulmonary resuscitation. The wrong medication was given. —adrenalin, deralin, atropine because of the large number of staff and lack of leadership and the commands were given by of more than one person"(N4).

2- Errors in ambo-bag use.

Some nurses lack how to use the ambo-bag appropriately and effectively during the resuscitation process, as one of the ICU nurses said "in our department some of the nurses don't use ambo-bagging

appropriately....."(N14).

Theme 5: Nursing procedure errors.

This theme is divided into 2 sub-themes:

1- Suction errors: ineffective suctioning of the endotracheal tube,

In some nursing procedures such as Suctioning the ET tube may cause adverse events for the patients "In many cases when the suction is not proceeding correctly led to a Cyanosis and the low level of oxygen saturation in the tissues" (N7).

"most of the nurses are not applying the Suction in the right and safe way, so often led to a blockage in the airway, as well as Infection. All of these errors could happen because of the lack of nurses' sufficient skills as well as negligence and malpractices by nurses" (N10).

2- Invasive procedure errors:

The data were expressed that some mistakes occurred during Invasive Procedures

—There was a Practical nurse who wanted to put a Cannula for the patient, during applying the cannula, he/she injured the pt's nerve in the hand" (N11).

—during the insertion of a foley Catheter for patients who had MI and were treated with Streptokinase, bleeding occurred during the insertion of the foley catheter. This occurred because of insufficient awareness of the adverse event of the treatment —(N7).

"During the insertion of NGT for a Stroke patient who was treated with heparin. Severe bleeding occurred. The reason was lack of knowledge of nurses and unavailability of the skills manual that required" (N8).

Theme 6: intravenous fluid/solution errors (IVF).

This theme is divided into two sub-themes:

1- Errors in the administration of IVF.

"Many of the nurses gave the wrong solutions to the patients, as giving N \ S instead of D \ W for hypertensive patients, and giving D \ W instead of N \ S for patients with diabetes, and this eventually led to an increased matter worse in both cases "(N9).

2- Error in the duration of administration of I.V solutions.

In many cases of administration of the IV Fluids some of —.....the nurses forget to close the

IV Line, after the completion of the solution and the reason for that, is the pressure of work and negligence as well.....(N2).

And —many times IV Fluids were not given to the patients on its time because of the problem in either the i.v. line or Canula or the lack of attention by the nurses (N2, N3).

Some nurses forget to give the IVF at an accurate timedelaying the administration of the solution.....another gave the solution before the accurate time (N12).

Theme 7: patient care errors.

This theme is divided into four sub-themes:

1- Dressing errors.

Lack of sterility in some procedures can be harmful to the patient

—" Some nurses did not apply the sterile technique during the insertion of the foley catheter in many cases which led to the occurrence of UTI and other complications" (N10).

"Nurses do not follow the sterile technique when applying needle, CV line, arterial line, and this often causes infections" (N7).

2- Positioning errors.

Patient Care is neglected in some cases which affect the patient's status negatively.

"Sometimes many hours pass without a position change for the long-lying patient as a stroke patient. This often led to the occurrence of pressure ulcers. This happens for several reasons mainly the lack of an adequate number of staff, as well

as negligence. This often occurs in the evening and night shifts (N6, N10, N7).

3- Mouth care errors.

—The nurses didn't make the mouth care as intended and in a proper way or they neglect that This can cause a problem as Pneumonia.—(N7).

4- Morning care errors.

"Some nurses are not interested in delivering the morning care for the patients, or they do that inappropriately"(N5, N6).

Theme 8: documentation and assessment errors.

This theme is divided into three sub-themes:

1- Errors in the recording of vital signs.

—The nurse recorded the vital signs of the wrong patient, but fortunately, the readings were normal"(N2).

2- Missed medication documentation.

In certain situations, errors occurred in the documentation and data recording.

"A practical nurse gave pethidine (Narcotic) and do not record it after an investigation found

.... and some nurses do not carry out a physical assessment of the patient or they do not

do it the right way and often with practical nurse "(N5).

3- Errors in the documentation of the patient's history and assessment.

"Some nurses do not take the full history of the patient and could cause harm to the patient, such as: gave patient aspirin who has gastric pain and ulcer"(N4).

Theme 9: miscellaneous

This theme includes one sub-theme which is poor communication between the nurse and doctors leads to errors and on the other hand between the nurse and the patients may affect the patient monitoring and the subjective data.

As one of the nurses said: "poor communication especially during resuscitation cases leads to error as a hodgepodge in the given medications" (N14).

Another said "for some time the patient in the intensive care unit seemed to sleep, but the patient was in bad condition....." (N12).

Interpreted whole

During the third and final step in the process of interpretation, the decoded picture, the study collected the various parts together and reflected on to a new whole. The researcher takes subjective transparency; this new whole with the pre-understanding reflects the significance/meaning hidden in the text Lindseth et al (2004). A new meaning and deeper understanding of the meaning of the phenomenon emerges.

Nurses' experience of the most common medical errors in ICU and CCU can be understood as: The most common error occurred in ICU and CCU is:

We found from nurse's experience the common medical errors in intensive and coronary care units are: Medication errors (the dilution, dose calculation, route, administration), devices errors (in dealing with ventilator, monitor, defibrillator, dropper machine), patient's monitoring errors (in I&O measurement, falling down, self-extubation and injury), resuscitation errors (in consequences of steps, ambo-bag use, and the defibrillator preparation), nursing procedure errors (as suction and invasive procedures), errors in the administration of intravenous fluid and its administration duration, patient care error (in morning care, dressing, mouth care, positioning), assessment and documentation errors (Errors in the recording of vital signs, medications documentation, documentation of patient's history and assessment).

The nurses concluded the causes of these errors as the following:

1. An Insufficient team and hard work.
2. Lack of knowledge and experience.
3. Lack of concentration.
4. Tension and stress.
5. Speed and acceleration
6. Double shifts and fatigue.
7. Lack of awareness.
8. Lacking guidelines and standards.

The results in numeric data:

Of fifteen interviews in intensive and coronary care units in five public hospitals in the West Bank, we found the most common medical errors much percentage of medication errors that are 22/72 (30.6%) were more specific in the calculation of medication dose 6/22 (27.3%) from medication errors (route 22.7%, 22.7% drug dilution, administration of wrong drugs 18.2%, administrative error 9.1%). In addition, patient monitoring errors were 14/72 (19.4%), and technical equipment errors were 10/72 (13.9%), patient care errors 8 / 72 (11.1%), nursing practice error 5 / 72 (9.9 %), intravenous fluids error 5 / 72 (6.9%), resuscitation failure 3 / 72 (4.2%), documentation and assessment error 3 / 72 (4.2%), poor communication 2/ 72 (2.8%). In addition, medical errors caused by practical nurses were about 39/72 (54%) and the errors that occurred on the night shift were around 23/72 (32%).

Method Discussion

Since this study aimed to describe and interpret the meaning of the nurses' experiences of the most common medical errors in intensive and coronary care units of the public hospitals, we chose the hermeneutic phenomenological method. This method is allowed in certain parts of the research use of its pre-understanding and interpretation based on theories. our pre-understanding has been an asset to understanding, explaining, describing, and interpreting the phenomena we examined, but it may also have involved a risk. we may have taken things for granted and not listened to the interview subjects, or not been sufficiently responsive and open. However, we have reflected on much of my pre-understanding during the process. The choice of method had been an option purely phenomenological approach, but then we shall bring our pre-

understanding in brackets, it was impossible that pure shall use the method. Merely using a hermeneutic method was not current when we were interested in studying the phenomenon from a life-world approach. The choice to use a hermeneutic phenomenological approach has enabled them to come to a deeper and wider interpretation to illustrate the phenomenon.

Our results will present one of several possible interpretations. Ricour (1998) argues that the text invites various readings and interpretations. Validity in qualitative studies is that the researcher must be aware that the validity should be carried out under certain policies throughout the research [17]. We have worked in the study based on the hermeneutic circle, we have oscillated between parts and whole and back again to the whole. During structural analysis, we have endeavored to relate ourselves as objectively as possible, to try to be open and question what is said during the analysis. To validate our work, the participants have carefully described their professional experience, and the context in which the interviews were conducted; the data material is processed in both the transcription and analysis. The study quotes were used to support the interpretations and to validate the meanings described in the results (Sandelowski, 1994). One way to further validate the result had been to discuss and criticize the study in workshops with teachers and students, but this has not been possible where there currently are few students who work with her graduate thesis at the department. We have used the scientific literature as relevant to the topic and under the supervision process, discussed the design, implementation, and analysis, together with our supervisor who has experience in the chosen research method.

The study has a small data set used, but more had not been possible given the time frame. The study objectives are not looking to be generalized but to describe the meanings of the phenomenon of nurses' experiences of the most common medical errors in ICU and CCU. All those surveyed nurses were willing to participate in the study. The nurses told with passion and commitment and tried hard to talk about situations they experienced as a nurse. However, they showed at times some difficulty in talking about their experiences and sometimes returned with statements like: "it is so difficult to describe it." The nurses felt that there was a large and diverse area and that they were not prepared for an "open question". One possibility would therefore be to attach the initial question in connection with the request for participation in the study.

Result discussion

We found the medical error was mostly caused by practical nurses. Inadequate training was a strong factor in committing the medical error which is in agreement with the medical errors report which was issued by European Commission (2006). The medical error results from inadequate training or a few "bad apples" in the system. It is then assumed that medical errors can be reduced or eliminated by identifying the individuals, and firing or disciplining them. The major drawback of this judgmental attitude is that it makes healthcare workers hesitate to report errors for fear of losing their jobs or fear of some other form of reprisal. As a result of underreporting, hospital managers and others concerned with patient safety often do not have an accurate picture of the frequency of occurrence of some types of medical errors. Nurses' stories

about their experiences of most common medical errors in ICUs\CCUs can be understood as the nurses moving toward a product that is characterized by contrasts and contradictions in their daily work. Contrasts in the role that experiences can be seen as highly prominent differences and contradictions in the importance of these experiences contain conflicting ideas. The meaning of experience in most common medical errors in this context is about the nurse moving from one situation during the day's work where the shifts of experiences are great.

To clarify our interpretation we depended on some articles that we read about. So in [12] talked about various most common medical errors in the ICUs \CCUs wards in general and divided them into different categories. One of these categories was medication error in ordering or execution of treatment (wrong dosage, duplicate medication orders, wrong medication, failure to discontinue a medication order, wrong rate or frequency, wrong route, omitted medication, wrong patient). In addition, [13] reflected that most medication errors regarded to fast bolus administration, wrong infusion rate, wrong dose or diluents, calculation errors, inappropriate diluents, inappropriate storage of drug before dilution, and inappropriate storage of diluted drugs. This highly agreed with our results about medication errors that were high percentage which is (22/72) 30.6% of the most common errors in these wards that include errors in rout of medications administration 22,7 %, errors in the calculation of medications doses 27.3%, errors in giving the right medications 18.2%, errors in the dilution of medications 22.7%, and errors in medications administration time 9.1%. In addition, other studies gave other wide ideas about the most common errors reported due to wrong mechanical or human performance which associated with some malfunctioning of equipment and checking it specially ventilators, monitors use and interpretation, defibrillator and dropper machines. These results are inconsistent with the results of our study showed that a high percentage of technical equipment errors 13.9% which includes errors in dealing with ventilators, errors in dealing with monitors, errors in dealing with the defibrillator, and errors in dealing with dropper [12, 14, 15, 16]. Some of the studies gave clear ideas about errors that were happen related to patient monitoring. This consists of failure to take precautions or follow protocol to prevent accidental injuries such as self-extubation and other types of errors [12, 15] which is reflected in our results. Do-not-resuscitate order and did not match true code states that what [12] described in their study and what we found that resuscitation errors occurred especially in steps consequence and Ambobag usage.

Procedure errors are another category that [8] and [12] described as invasive procedures (Arterial cannula, central venous catheter, foley's catheter). This was clear in our study and added to its suction errors. Other errors associated with negligence were about IV fluids (administration and duration) which are present in [13, 14] studies and proved in our study which happen in a low percentage (6.9%). [8] were shown that not using the appropriate antimicrobial treatments (mouth and other body opens), and other care may not be routinely implemented leading to some complications such as pneumonia and other injured and invasive procedures site infections (cannula, CV line). This is clarified by the presence of some patient care errors (11.1%) including wound dressing, Positioning, Mouth care, and morning care errors. Documentation

and inadequate patient assessment errors (such as physical and electrocardiographic assessment) are a strong presence in [12, 16] studies. this is in the agreement of our study associated especially with the recording of vital signs, missed medications documentation, and documentation of patient's history and assessment errors. Communication errors that were described in [12, 15] studies are reflected in our study and it was the lowest prevalence (2.8%).

Conclusion

Medical errors are common in ICUs and CCUs. Nurses' experiences in maintaining the quality of the practice are important in the context of today's safety and quality agenda. The method for identifying deficiencies and redesigning faulty systems appears to be a promising way to propose strategies to prevent errors, Practical nurses made substantially more medical errors. Working frequent shifts of 24 hours is a strong factor to commit medical errors. Increasing the competency and number of nurses per patient and reducing the number of working hours can reduce medical errors and address patient safety concerns in intensive and coronary care units.

Study limitations:

- Ramallah hospital was excluded from our study due to the hospital's transient stage.
- A limited number of participants who fulfill or meet the including criteria —there is a practical and registered nurse in ICU, CC so we obligate to choose a Convenience sample instead of a randomized sample.
- Some of the participants refused to record the interview.

The recommendations for reducing medical errors:

- 1st Ask when you do not know.
- 2nd Enhance and develop your knowledge. eg. Constitutes a talk...
- 3rd training programs.
- 4th Provide enough team.
- 5th Distribution shifts comfortable.
- 6th Follow the rights of medication given
- 7th does not let a nurse who had no ICU experience working in ICU and CCU.
- 8th Check department equipment daily.
- 9th Awareness.
- 10th Availability of the Job Description.
- 11th A committee should be established as head of appliances and equipment.
- 12th improve the skills of critical care nurses. there should be a minimum of BSc nurses.
- 13th improves the communication process among the health team.
- 14th Insertion of incident reporting system, and computerized

reporting.

We recommended reducing the medical errors in ICU and CCU to use the computerized reporting system highlighted in [23] emphasizing reporting systems as an important strategy to learn from mistakes and prevent a recurrence. Reporting systems have the potential to serve two important functions. They can hold providers accountable for performance and can provide information that leads to improved patient safety.

Improving medication safety can be achieved by optimizing the safety of the medication process, eliminating situational risk factors, and providing strategies for intercepting errors and mitigating their consequences. Several interventions have been shown to reduce medical errors in ICU. The safest and most effective way to improve patient safety is to improve the safety of the pharmaceutical process. Strategies that have proved successful include medication standardization computerized physician Order entry (CPOE), and computerized infusion devices. The technology enables physicians to enter orders directly into a computer workstation connected to a hospital's clinical information systems. The main advantages of these systems are that they can detect allergies recommends drug dosages, make adjustments for patients with altered renal function and identify potential interactions with other drugs.

Two systematic reviews have documented that CPOE systems increase clinician adherence to guidelines and warnings, improve organizational efficiency, reduce costs, and prevent medication errors, but there is limited evidence to support improved patient safety. In this regard, CPOE technology highlights the important distinction between errors and damage, failure is an important intermediate result, but preventing harm to the patient is the ultimate goal. CPOE technology is currently used in the majority of the ICUs. Bar code technology case management phase of the medication process. Used in conjunction with CPOE, bar code labels for medicines, patient, and provider administer medicines scanned, reconciled, and electronically documented. This process helps the right patient gets the right dose of the right medicine by the way at the right time. Administration errors have been documented by 60%. Computerized intravenous infusion devices may incorporate CPOE and bar code technology for intravenous medications so that the standard concentrations, infusion rates, and dosage limits can be provided to prevent intravenous medication errors.

Nurses play a particularly important role in patient safety because they are the caregivers with whom patients are likely to spend the greatest amount of time. This has two important implications. One, declining nurse-to-patient staffing levels may be associated with an increased the risk of medical error. The nurse-to-patient ratio of 1:1 or 1:2 seems to be the safest in the ICU. Second, the nursing experience can have a major impact on patient safety. Experienced nurses are more likely to intercept errors compared with less experienced nurses. Three simple strategies to change the medicine's approach to medication error has proposed: (a) recognize that the current strategies for preventing medication errors are inadequate; (B) improve the reporting client system, avoid punishment and focus on identifying potential performance improvement; and (c) understand and improve human performance in the medication use process. We should focus on developing

a system that sees people as fallible and assumes that errors will occur, even in the best organizations. Error reporting is an important part of this strategy because shows how active failures and latent conditions in systems. Incidents that do not lead to injury could have led to patient injuries. Preferably error reporting should be voluntary, anonymous, centralized increase the pool of data, and aims to identify opportunities for performance improvement. But error reporting alone will not improve patient safety, but rather is the first step in a continuous quality improvement cycle.

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